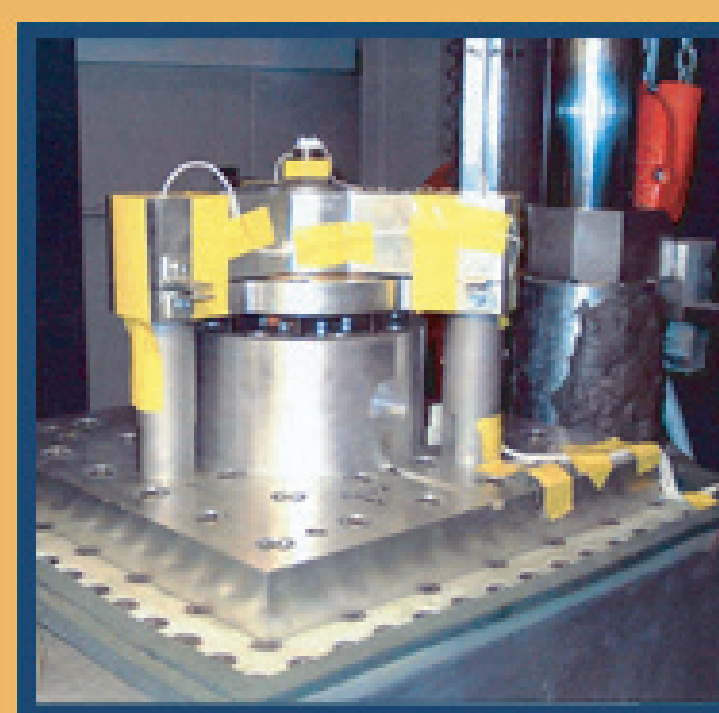
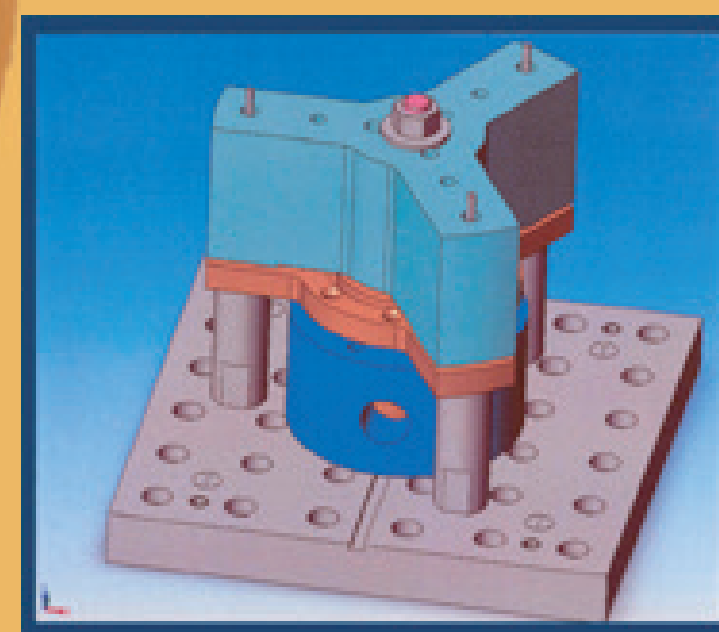


Engineering Sciences and Applications Division

Stockpile *Refurbishment*

Bringing Weapons Systems into the 21st Century

Originally designed to last about ten years, the warheads in the U.S. stockpile are now 15 to 30 years old and are expected to last at least another 30 years. To ensure that these weapons remain safe and reliable, the Laboratory conducts yearly assessments on weapons systems. In some instances, such assessments recommend that certain components and materials be replaced, redesigned, or rebuilt. These refurbishments are conducted through a Stockpile Life Extension Program, a formal process that leads to one of two possible changes to the warheads. These changes are officially designated as modifications (MODs) and alterations (ALTs).

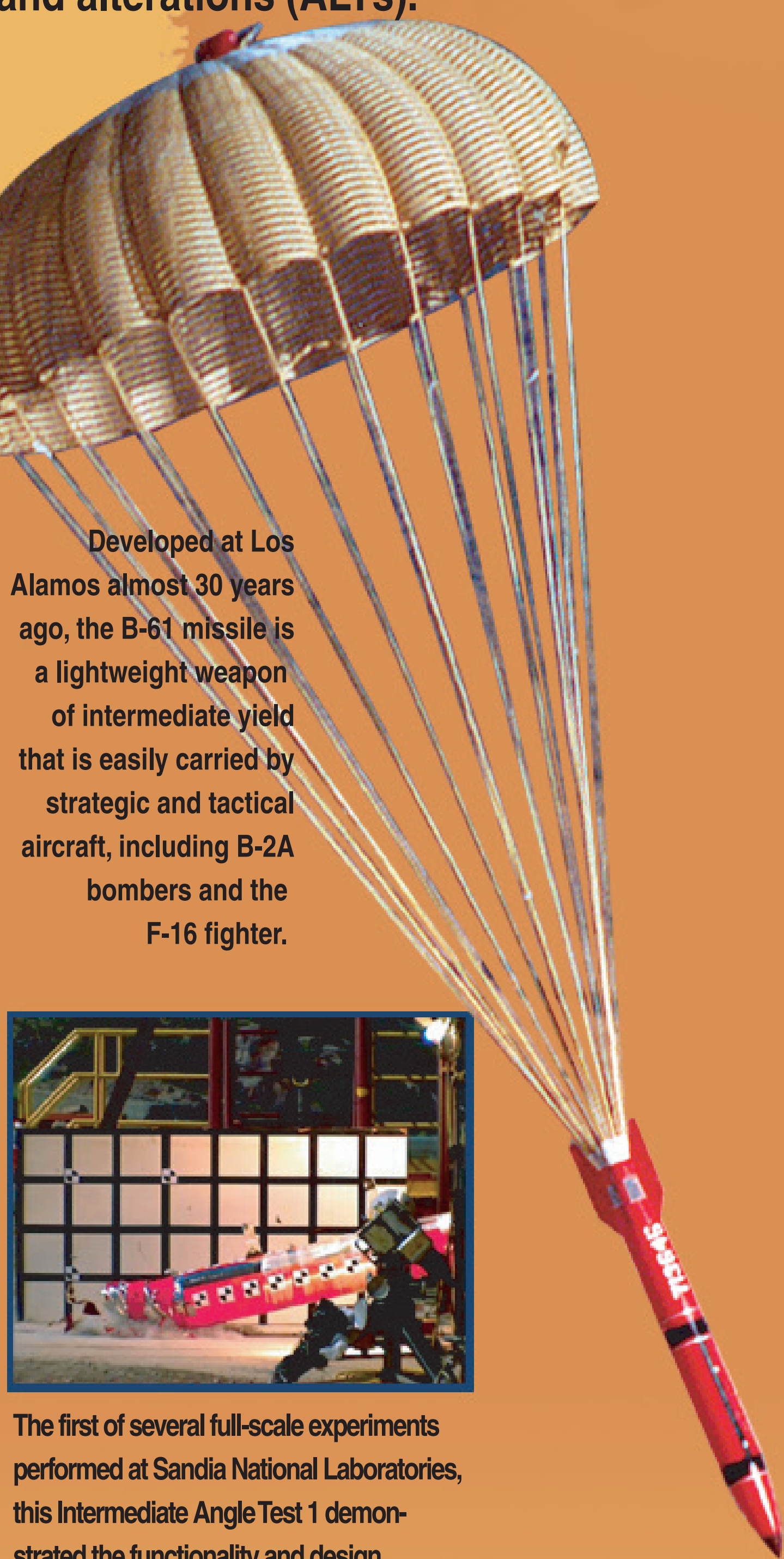


Two groups—Weapons Materials and Manufacturing and Weapons Response—design (top), fabricate, and calibrate (bottom) instruments. These instruments are used to test materials in small-scale components designed by the Weapons Systems Engineering Group.

Meeting Performance Requirements

Working with organizations throughout the Nuclear Weapons Complex, the Engineering Sciences and Applications (ESA) Division plans and executes all engineering facets of a refurbishment, making sure that physics requirements for material and component behaviors are met in the absence of new data from underground nuclear testing, which ceased in 1992. To achieve this goal, ESA performs computer simulations and conducts tests and analyses to ensure that any changes to the warhead meet weapon-system performance requirements established by the Department of Defense. ESA is presently conducting two refurbishments, ALT 357 of the B61-7/11 bomb and MOD 1 of the W76 warhead.

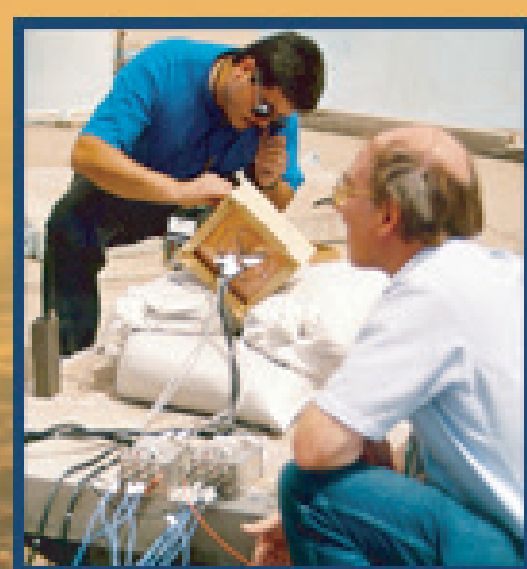
For both refurbishments, ESA will replace some older materials with newer and stronger ones, improve the quality and lifetime of other materials, and bolster reliability and safety through upgraded component designs and assembly techniques. These changes will be carefully simulated, tested, and analyzed by component and system (ground, flight, and hydrodynamics) tests and computer models. ESA will assemble the test units, participate in the tests, and analyze results to ensure that system design intent and specifications are met.



Developed at Los Alamos almost 30 years ago, the B-61 missile is a lightweight weapon of intermediate yield that is easily carried by strategic and tactical aircraft, including B-2A bombers and the F-16 fighter.



The first of several full-scale experiments performed at Sandia National Laboratories, this Intermediate Angle Test 1 demonstrated the functionality and design survivability of a new secondary for a nuclear weapon—the secondary is the part providing most of a nuclear weapon's explosive power. This experiment also verified that the secondary does not adversely affect the physics package even under extreme or atypical conditions.



Easily launched by a submerged submarine, the Trident missile system (upper background of panel) has been around since 1979. This system uses W76 warheads, which Laboratory scientists are modifying and testing (left) to further improve performance and safety.



Because warhead lifetimes are extended, ESA must train a new cadre of weapons engineers who will be knowledgeable about the warheads. The Joint Nuclear Explosives Training Facility provides hands-on training for weapon engineers, technicians, and others involved in nuclear weapons design, fabrication, assembly, and testing.

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